

# Hematological malignancies in relation with ABO blood group at a teaching hospital, Varanasi, India

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## ABSTRACT

**Background:** There has been enormous progress in the diagnosis and treatment modalities of leukemia, but its pattern and prevalence vary throughout India. This inter-regional variation may be due to geographic, cultural or racial variation or maybe due deficiency in case of notification, especially in rural areas. **Objective:** The aim of our study is to determine the prevalence of different types of hematological malignancies with the ABO blood group at a teaching hospital in Varanasi, India. This cross-sectional study of 77 cases was conducted during 2016–2017 at a tertiary care center. We analyzed the age, sex, subtype of leukemia, blood group, clinical features, and laboratory parameters of patients. Age ranged between 1 year and 81 years with a male to female ratio of 1.9:1. A total of 66.3% of patients were suffering from acute leukemia and 33.7% from chronic leukemia. The most common blood group was B positive (44.8%) but no significant association was found ( $P = 0.822$ ). Fever (76.6%) and generalized weakness/easy fatigability (46.75%) were common complaints, whereas pallor (68.8%) and splenomegaly (51.9%) were common signs. Cases were from 23 districts of eastern Uttar Pradesh and western Bihar. The majority of the cases (70.12%) were from 8 districts (Jaunpur, Varanasi, Azamgarh, Ballia, Bhadohi, Gazipur, Kaimur, Rohtas) of Uttar Pradesh, India and Aurangabad district of Bihar. Acute leukemia is more prevalent than chronic leukemia with more male preponderance. Acute lymphoblastic leukemia (ALL) were commonly found in children, acute myeloid leukemia (AML) was found in both children and adults. Chronic Myeloid Leukemia (CML) and chronic lymphocytic leukemia (CLL) mainly noted in adults. Unclassified acute leukemia was seen mainly in children and young adults. Anemia was more severe in acute conditions and thrombocytopenia was also more in acute leukemia. The most common blood group was B positive.

**Keywords:** ABO blood group, hematological malignancies, leukemia

## Introduction

Hematological malignancies are neoplasia of blood or bone marrow involving either myeloid or lymphoid series. It comprises of a various heterogeneous group of disease with wide age, geographical distribution, and genetic and molecular variation. With the advancement of immunophenotyping, cytogenetic, and treatment modalities there is a great improvement in diagnosis, categorization, and prognosis

of the disease. Hematological malignancies are broadly classified as leukemia, myeloproliferative neoplasm (MPN), plasma cell dyscrasia, and lymphoma. Acute leukemias can be myeloid (acute myeloid leukemia, AML) or lymphoid (acute lymphoblastic leukemia, ALL). AML occurs at all age with peak age after 60 years.<sup>[1,2]</sup> About 85% of ALL are B Cell-ALL, which typically manifest as childhood acute leukemias. Chronic lymphocytic leukemia (CLL) is a clinically heterogeneous disease of middle and old age characterized by the accumulation of mature lymphocyte in blood, marrow, lymph nodes and spleen. MPN is comprised of chronic myelogenous leukemia, primary myelofibrosis, polycythemia vera and essential thrombocythemia. The most common MPN is CML.<sup>[3]</sup>

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## Objectives

To determine the prevalence of different types of hematological malignancies with ABO blood group at a teaching hospital in Varanasi, India.

## Materials and Methods

Study was approved by ethical committee on 09/11/2016. This study enrolled 77 leukemia cases diagnosed from the department of pathology from 2016 to 2017 and given consent for the study. The study was approved by the institutional ethics committee. Socio-demographic data and detailed history of both pediatric and adult patients were obtained. Complete blood count was done on seven-part hematology autoanalyzer (Beckman Coulter). Bone marrow aspiration was done from the posterior superior iliac spine. The peripheral blood and bone marrow aspiration smears were stained by Leishman stain. Leukemia was diagnosed according to French–American–British (FAB) criteria based on morphological and cytochemical features. The cytochemical stain used in this study was Sudan Black B (SBB).

## Results

This study includes 77 patients affected with leukemia, out of which 51 were male and 26 were female with male to female ratio of 1.9:1. Twenty three (29.9%) patients were of AML, 22 (28.6%) patients of CML, 20 (26%) patients of ALL, and 4 (5.2%) of CLL. Among these, 8 (10.4%) patients were unclassified and categorized as acute leukemia (unclassified). Among acute leukemia patients, 64.70% were male and among chronic leukemia 69.23% were male [Table 1]. The most common clinical feature in our study was fever (in 76.6% cases) followed by generalized weakness or easy fatigability (46.75%) and progressive paleness (22.07%). Physical examination revealed pallor as predominant finding detected in 68.8% of patients followed by splenomegaly in 61.03% patients. Hepatomegaly and lymphadenopathy were noted in 27.27% and 23.37% patients, respectively. Gum hypertrophy was seen in 3 (3.89%) patients [Table 2].

Mean hemoglobin was  $7.17 \pm 3.08$  gm/dl with median value of 7.8gm/dl. Mean hemoglobin was  $6.30 \pm 2.71$  g/dl,  $6.56 \pm 2.31$  g/dl,  $7.8 \pm 3.13$  g/dl,  $9.5 \pm 2.75$  g/dl, and  $12.95 \pm 1.48$  g/dl in AML, ALL, unclassified AL, CML, and CLL patients, respectively. The median value of the total leucocyte count was  $22.6 \times 10^3/\text{ul}$  (range  $0.19\text{--}372.0 \times 10^3/\text{ul}$ ). Median platelet count was  $45 \times 10^3/\text{ul}$  (range  $2\text{--}857 \times 10^3/\text{ul}$ ). Blood group was not known to all patients, in a few cases grouping was done in the laboratory but few patients denied to give a blood sample. So blood group of 67 patients was done. Blood groups in acute conditions (AML, ALL) were AB in 4.5% patients, A in 14.9% patients, B in 28.4% patients and 19.4% of total patients. In chronic leukemia, blood group AB was in 1.5%, A in 4.5%, B in 16.4%, and O in 10.4% of total patients. Most of the cases were from Jaunpur ( $n = 9$ , 11.6%) and Varanasi ( $n = 8$ , 10.3%) followed

**Table 1: Age, sex, and hematological parameters in different types of leukemia ( $n=77$ )**

Parameters	AML, $n=23$	ALL, $n=20$	Un (AL), $n=8$	CML, $n=22$	CLL, $n=4$
Prevalence (%)	29.9	26.0	10.4	28.6	5.2
Median age (years)	24	11.50	23.50	42.50	48.0
Age range (years)	1-81	1-30	4-71	13-72	46-50
Male	15	11	7	14	4
Female	8	9	1	8	0
Sex ratio	1.8:1	1.2:1	7:1	1.7:1	-
Mean Hb (gm/dl)	6.30	6.56	7.8	9.5	12.95
Median TLC ( $\times 10^3/\mu\text{l}$ )	7.29	43.4	22.35	57.35	30.98
Median platelet ( $\times 10^3/\mu\text{l}$ ) count	25	35.00	35.50	232.5	130.50

by Azamgarh ( $n = 6$ , 7.79%), Ballia ( $n = 6$ , 7.79%), Gazipur ( $n = 5$ , 6.4%), Bhadohi ( $n = 5$ , 6.4%), and Mirzapur ( $n = 3$ , 3.8%) districts of eastern UP. A total of 55.55% of patients from Jaunpur, 50% of patients from Varanasi, and 50% of cases from Azamgarh were suffering from AML. From Ballia, AML and CML patients were 33.3% each. From Bhadohi all cases were of ALL. One case each from Sonbhadra, Mau, and Deoria were also reported. From adjacent states, patients were mainly from Bihar. More cases were from Aurangabad (6.49%) and Rohtas (6.49%) followed by Buxar (5.19%) and Kaimur (3.89%). Few cases were also from East Champaran, Gopalganj, Muzaffarpur, Bhojpur, Chapra, Nawada, and Sitamadi of Bihar. From Jharkhand, a single case of ALL was found from the Gadhwa district.

## Discussion

This study revealed that acute leukemia (66.23%) was more prevalent than chronic leukemia which is in concordance with other studies.<sup>[4-9]</sup> In our study, AML was the most common leukemia followed by CML, ALL, unclassified acute leukemia, and CLL, which is similar to other studies.<sup>[7-9]</sup> In many studies, CML is the most common type of leukemia.<sup>[5,10-12]</sup> In few studies, ALL was common leukemia.<sup>[4]</sup> This could be due to geographical and cultural variations. In our study, there is a male preponderance of occurrence of hematological malignancies with male to female ratio of 1.9:1, which is similar to other studies ranging from 1.7:1 to 2:1.<sup>[4,5,13]</sup> There is no clear risk factor for higher incidence among males. This increased incidence may be due to more exposure to occupational environmental carcinogens.<sup>[1,5,14,15]</sup> Our study is a Hospital-based study, more male cases were reported as India is male dominating society and gets more attention in our society. This may not be the true incidence as many female cases are missed as they never been to the hospital. In India, the reported incidence of leukemia has increased over the last 25 years, but the increase is much higher in females than that in males.<sup>[16]</sup> The disproportionately higher increase in the incidence of childhood leukemia in females could reflect in the shift in the attitude of society towards the female child. But in our study, pediatric ( $\leq 15$  years) M: F ratio is 1.9:1, which shows the incidence of childhood leukemia in males is high. The blood group can be used as an epidemiological

Table 2: Clinical features in different types of leukemia

Symptoms and Signs	AML (total case=23)		ALL (total case=20)		Un (AL) (total case=8)		CML (total case=22)		CLL (total case=4)	
	n	Percentage	n	Percentage	n	Percentage	n	Percentage	n	Percentage
Fever	19	82.6	19	95	8	100	11	50	2	50
Progressive Paleness	7	30.4	8	40	2	25	0	0	0	0
Generalized weakness/easy fatigability	14	60.8	4	20	3	37.5	13	59	2	50
Bodyache	1	4.3	0	0	0	0	2	9	0	0
Abdominal pain/discomfort	1	4.3	2	10	0	0	10	45.4	0	0
Bleeding	5	21.7	4	20	2	25	3	13.6	0	0
Cough	3	13	3	15	2	25	2	9	0	0
Dyspnea	1	4.3	1	5	0	0	0	0	0	0
Joint pain	0	0	2	10	1	12.5	0	0	0	0
Vomiting	1	4.3	2	10	0	0	0	0	0	0
lymphadenopathy	3		10		3		1		2	
Gum hypertrophy	2		1		0		0		0	
Splenomegaly	7		7		5		20		1	
Hepatomegaly	4		4		3		1		1	
Pallor	19		19		6		9		0	

marker for selecting population subgroups that may be at risk of developing different hematological malignancies.<sup>[17,18]</sup>

In this study, the most common blood group of leukemia patients was B+, but no significant association has been found with any type of leukemia. Harendra M *et al.* also found the highest number of leukemia patients in the B+ blood group.<sup>[4]</sup> The distribution by the blood groups of the two leukemia series and the systematic comparison of the sample in a study showed the tendency of leukemia to occur less frequently in persons of O blood group than B and AB blood group but such association is not seen in our study.<sup>[19]</sup>

We studied the distribution of various leukemia patients according to different districts of Eastern Uttar Pradesh. The number of cases were reported from Jaunpur, and Varanasi followed by Azamgarh, Ballia, Mirzapur, Gazipur, and Bhadhoi. Cases were also reported from Sonbhadra, Mau, and Deoria. In Jaunpur, 55.55% of patients were suffering from AML and in Varanasi, 50% were AML patients, and 50% of cases from Azamgarh were AML. From Bhadhoi all cases were of ALL. No cases were from capital city Lucknow and western UP, it may be due to the availability of good medical facilities in Lucknow and patients from western UP may have access to treatment of leukemia in the hospitals from bordering states.

## Conclusion

Acute leukemia is more prevalent than chronic leukemia with more male preponderance. AML is the commonest leukemia. ALL was commonly found in children, AML was found in both children and adults. CML and CLL were mainly noted in adults. Unclassified acute leukemia was seen mainly in children and young adults. Common clinical features were fever, generalized weakness or easy fatigability, progressive paleness, splenomegaly,

hepatomegaly, and lymphadenopathy. Anemia was more severe in acute conditions and thrombocytopenia was also more in acute leukemia. The most common blood group in this study was B positive.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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## Conflicts of interest

There are no conflicts of interest.

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